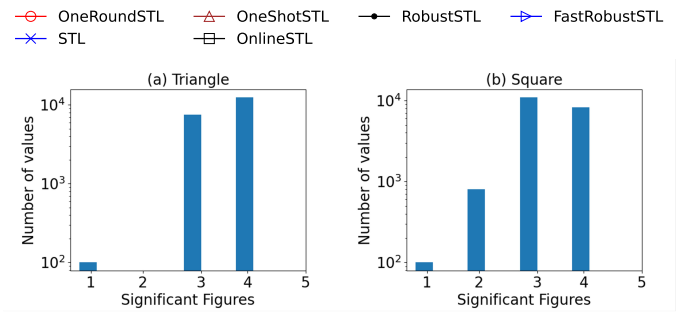

Fig. 17: Exp on Threshold Determination

APPENDIX

A. Pre-calculation Algorithm

Algorithm 4 shows the details of OneRoundSTL pre-calculation. Line 1 constructs the vector b using the original data x and the baseline seasonal component v obtained in the cold start phase. If a missing value is encountered, Lines 4 utilize missing values handling method. Otherwise, Line 6 pre-calculates each b_i.

Algorithm 4: OneRoundSTL Pre-calculation

Input: $x \in \mathbb{R}^N, t \in \mathbb{R}^N, v \in \mathbb{R}^T, L \in \mathbb{R}^{2N\times 2N}, D \in \mathbb{R}^{2N\times 2N}$

Output: $z \in \mathbb{R}^{2N}$

1 construct $b \in \mathbb{R}^{2N}$ by Formula 3;
2 **foreach** b_i **do**
3 **if** b_i *is missing* **then**
4 calculate z_i by Formula 12
5 **else**
6 calculate z_i by Formula 11
7 **return** z;

As for time complexity, the construction and forward substitution time complexity of each b_i is O(1). Its total time complexity is O($2N$).

As for space complexity, i.e., space cost of pre-calculated results z, it is closely related to the original data, and each x_i corresponds to two z_i. Therefore, we store its corresponding x and z in the same page. The space complexity of z is O($2N$).

B. Experiment on Threshold Determination

We will present methods for determining the threshold parameters ϵ and ζ in sections 3.2 and 5. Specifically, we utilize the dataset's precision to establish these thresholds. ϵ governs the precision of L and D, which, as shown in Figure 2, undergo a squaring operation during usage. Consequently, epsilon is determined by the square root of the dataset's precision. In contrast, ζ determines the precision of the intermediate variable z, which involves only linear operations. Hence, zeta is set equal to the dataset's precision.

Figure 17 illustrates the distribution of significant figures across the dataset. We select the significant figures corresponding to the peak, which in this case represents the dataset's precision of 1e-4. Therefore, ϵ is set to 1e-2 and ζ is set to 1e-4. As demonstrated by Figures 4 and 5, this threshold selection provides OneRoundSTL with high performance and low time overhead, validating the effectiveness of our threshold determination method.